

ABSTRACT OF THE DISCLOSURE

Broadband optical switches based on adiabatic couplers having a pair of asymmetric waveguides with variable curvature sections include in a 2x2 configuration based on a Mach-Zehnder interferometer two such adiabatic couplers, and in a 1x2 or 2x1 configuration an adiabatic coupler and an Y-splitter. Each adiabatic coupler includes two waveguide branches of different but constant widths having curved sections with varying radii, separated over a coupling length by a changing spacing therebetween and blending in an asymmetric intersection area, and two symmetric branches. In the 2x2 switch, the two adiabatic couplers face each other with their respective symmetric branches, and are connected by the two identical arms along a main propagation axis in a mirror image. The utilization of the variable curvature adiabatic couplers in silica MZI switches on a silicon substrate provides switches with an exceptional broadband range (1.2-1.7 μm), very high extinction ratios (>35dB), low fabrication sensitivity and polarization independent operation. The switches are significantly smaller than known broadband switches, have significantly smaller excess loss, faster switching time and low power consumption.